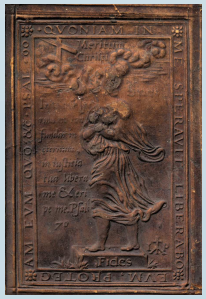
ICOM-CC

Melbourne, ICOM - CC Triennial Meeting 2014

Imaging the Topography of Illuminations and Bookbindings with Reflectance Transformation Imaging

A 2D+ imaging tool for Art-technical and Conservation Monitoring

RICH Project – Reflecting Imaging for Cultural Heritage

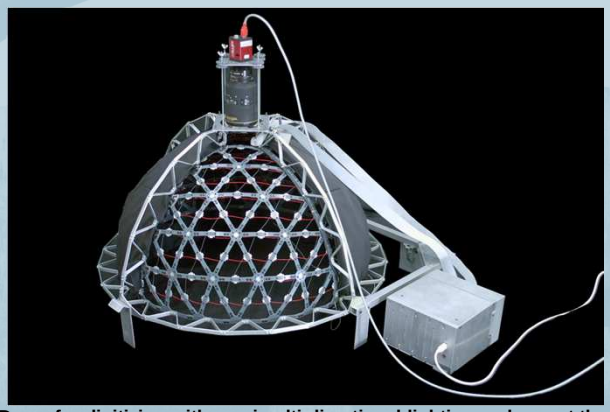


KU Leuven
Illuminare
Faculty of Arts, CS Digital
University Library
ESAT-Visics, Department of Electrical Engineering
Leuven, Belgium

Lieve Watteeuw &
Bruno Vandermeulen

Contact:
lieve.watteeuw@arts.kuleuven.be
Website

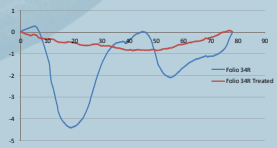
To document surface characteristics of graphic materials, supports and pictorial layers, the digital imaging device was developed in at Leuven University (Belgium). A camera of 28 million pixels is digitizing the objects with omnimulti-directional lighting and export the result to 2D+. The technique is based on polynomial texture mapping, also known as Reflectance Transformation Imaging (RTI), a method of imaging and interactively displaying objects under varying lighting conditions to reveal surface phenomena. The underlying processing is based on the extraction of surface characteristics using methodologies such as photometric stereo and BRDF analysis (Bidirectional Reflectance Distribution Function). The module is a hemi-spherical structure with a single downward looking video camera. The object to be captured (maximum 180 to 120 mm) lies in the center and is illuminated from computer-controllable lighting directions, through the subsequent activation of multiple white LEDs (260). The different angles that illuminate the surface of the artifacts are revealing extreme details.



Dome for digitizing with omnimulti-directional lighting and export the result to 2D+

Examination and identification of the production of scripts, miniatures, gold tooling, embossing, stamps on paper and parchment, gold- and blind tooling on leather book covers. For changes in their structures (ea. cockling, tractions, folds, lacunas, retouching, scratches, abrasion) the imaging tool proved to be an extremely accurate. Complementary, RICH is useful to monitor and measure the conservation and preservation status of an object before and after treatment, transport or exhibition.

The implementation of a scaling and measuring tool with grid (1 mm) in the software enables the researcher – conservator to export graphically the dimensions and changes of topographic characteristics until 10 microns.

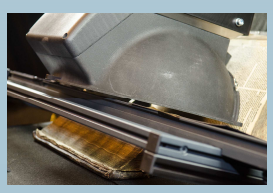


Undulation profile before treatment over 83 mm
1. Left: 3,23618 mm
2. Central: 4,53664 mm (blue)

Undulation profile after 10 minutes relaxation in a Gore-Tex envelope and flattening
1. Left: 1,38181 mm
2. Central: 0,88916 mm (red)

Conclusion: through soft and minimal relaxation of the parchment a reduction of 80% (central – see graph above) and 42 % (left) of the undulation could be obtained.

Before treatment **After relaxation and flattening**
Antiphonary, Flanders, early 14th century, parchment Folio 4r, Noah building his Ark, historiated initial: 830 mm x mm.



Preservation book copy stand for save imaging
A second prototype of micro-dome is developed with a smaller cupola of 30 cm, holding 200 white Lets. For book conservation reasons, a slice of the minidome is removed, allowing the tool to monitor in 150 degrees. The micro-dome is mounted on a special designed book conservation cradle designed by the university of Graz in Austria, so we can image with RTI inside fragile books with delicate historic bindings, without risk to stress or damage. Light suction on a bar is flattening gently the paper or parchment folio's during the four minutes of imaging. The shape of the micro-dome allows to visualize into the gathering fold.

2. Antwerp, Museum Plantin-Moretus, M 15.1 & M. 15.2. *Bible of Konrad of Vechta*, Bohemia, 1402-1403,
Left: M 15.2 fol. 4v-5r
Right: Fol. 47v: the Lord addressing Moses and the Israelites,

Miniature with gold patterned background: raised gold on a gesso, lozenge motif and punched floral patterns, border with roundels.

Left: miniature: 101,89 mm x 79, 47 mm. Imaging with raking light

Right, detail, floral pattern: Imaging with shaded filter

Art-technical documentation: after adding the gold leave on the raised gesso, first the lines for the frame were tooled. Then the double lines for the lozenge pattern were tooled. The 13 full floral stamps are identical; they have the same irregularities and were stamped at the exact same X-Y position. The partially added floral stamps on the edges are created by adding pressure to one part of the handle.

3. **Antiphonary, Flanders, early 14th century, parchment Folio 4r, Noah building his Ark, historiated initial: 830 mm x mm**